invention to obtain a stator assembly 216 having a reproducible resonance spectrum.

The phase change material used to make the body is preferably a thermally conductive but non-electrically conductive plastic. In addition, the plastic preferably includes ceramic filler particles that enhance the thermal conductivity of the plastic while improving the loss factor or ability to damp vibration. A preferred form of plastic is polyphenyl sulfide (PPS) sold under the trade name "Konduit" by LNP. Grade OTF-212 PPS is particularly preferred. Examples of other suitable thermoplastic resins include, but are not limited to, thermoplastic resins such as 6,6-polyamide, 6-polyamide, 4,6 polyamide, 12,12-polyamide, and polyamides containing aromatic monomers, polybutylene terephthalate, aromatic polyesters, liquid crystal polymers, polycyclohexane dimethylol terephthalate, copolyetheresters, polyphenylene sulfide, polyacrylics, polypropylene, polyethylene, polyacetals, polymethylpentene, polyetherimides, polycarbonate, polysulfone, polyethersulfone, polyphenyloxide, polystyrene, styrene copolymer, mixterus and graft copolymers of styrene and rubber, and glass reinforced or impact modified versions of such resins. Blends of these resins such as polyphenylene oxide and polyamide blends, and polycarbonate and polybutylene terephthalate, may also be used in the invention.

The hard disc drive components of one embodiment of the present invention are insert molded with a monolithic body of a phase change material that unitizes the subcomponents of the hard disc drive components. The hard disc drive system has a body of phase change material that unitizes some or all non-

moving components of the hard disc drive.

The hard disc drive and its motor assemblies include one or more, and generally a plurality of solid parts to be used in the motor either near or within the body, such as bearings and inserts. In addition, there are solid parts that are near the body, such as a disc support member and a hard disc drive base. The preferred method of developing the hard disc drive comprises designing a phase change material to have a coefficient of linear thermal expansion such that the phase change material contracts and expands at approximately the same rate as the one or more solid parts. For example, the preferred phase change material should have a CLTE of between 70% and 130% of the CLTE of the core of the stator. The phase change material should preferably have a CLTE that is intermediate the maximum and minimum CLTE of the solid parts where the body is in contact with different materials. Also, the CLTE's of the body and solid part(s) should preferably match throughout the temperature range of the motor during its operation. An advantage of this method is that a more accurate tolerance may be achieved between the body and the solid parts because the CLTE of the body matches the CLTE of the solid parts more closely.

Most often the solid parts will be metal, and most frequently steel, copper and aluminum. The solid parts could also include ceramics. In almost all motors there will be metal bearings. Thus it is preferred that the phase change material have a CLTE approximately the same as that of the metal used to make the bearings.

Most thermoplastic materials have a relatively high CLTE. Some

thermoplastic materials may have a CLTE at low temperatures that are similar to the CLTE of metal. However, at higher temperatures the CLTE does not match that of the metal. A preferred thermoplastic material will have a CLTE of less than 2×10^{-5} in/in°F, more preferably less than 1.5×10^{-5} in/in°F, throughout the expected operating temperature of the motor, and preferably throughout the range of 0°F to 250°F. Most preferably, the CLTE will be between about 0.8×10^{-5} in/in°F and about 1.2×10^{-5} in/in°F throughout the range of 0°F to 250°F. When the measured CLTE of a material depends on the direction of measurement, thickness of the sample, or conditions of molding, the relevant CLTE for purposes of defining the present invention is the CLTE of an encapsulated component in the direction in which the CLTE is lowest. Preferably, the CLTE in other directions is not more than 4 times the lowest value. The CLTE values are measured by a standard ASTM test method where the phase change material has the shape and form of the monolithic body that is overmolded on a component..

The CLTE of common solid parts used in a motor are as follows:

	23°C	250°F	
Steel	0.5	0.8	($x10^{-5}$ in/in°F)
Aluminum	0.8	1.4	
Ceramic	0.3	0.4	

Of course, if the motor is designed with two or more different solids, such as steel and aluminum components, the CLTE of the phase change material would preferably be one that was intermediate the maximum CLTE and the minimum CLTE of the different solids, such as 0.65 in/in°F at room temperature and 1.1